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CONTENTS PAGE

THE COVER

A 20-pound lake trout from Big Trout Lake, held by Douglas Meekis, assistant to J.J. Armstrong, author of report in this issue. Back cover: commercial fishermen on Big Trout Lake.

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Fish, Game and Snowmobiles

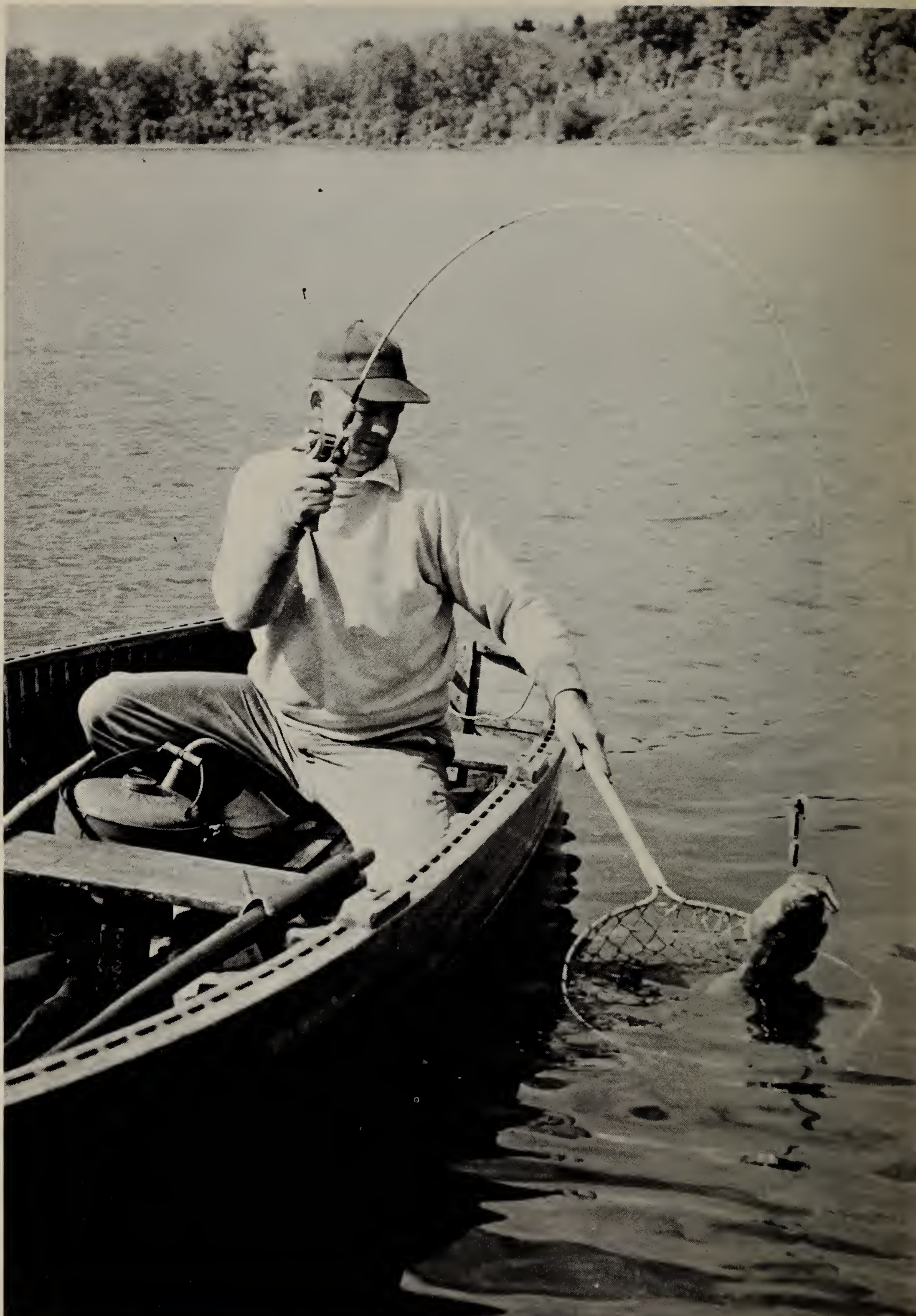
There was a time, B.S.M. (before snow mobiles), when outdoor activity in winter was a dubious pleasure, limited by an individual's stamina and ability to withstand the cold and fettered by slow and laborious methods of travel. Now, however, all is changed.

The snowmobile takes its proud place beside the new home in suburbia; the two cars in the driveway; the boat; motor and trailer for summer use; and the winterized cottage or retirement home in the country. Aside from being functional and of great assistance to those who must travel in winter, they are also good for just plain fun— and a whole series of outdoor activities, both new and improved, being developed around the little marvels.

A recent survey by the Department reveals that the use of snowmobiles is becoming increasingly popular in winter fishing. Even though roads are open to lakes, the machines are still the best means of travel on the ice, and anglers have been quick to realize their potential. A sample survey of 3,518 anglers, checked this year during January and February, showed that 896 snowmobiles were being used. Usually, two men ride on one machine; this means that about fifty per cent were utilizing snowmobiles.

Increased use of snowmobiles in hunting has also been measured. A border check conducted at Pigeon River in the Port Arthur Forest District revealed that of sixty-seven moose hunters who reported using snowmobiles, fifty-four said the machines played an important part in their hunt. This group of sixty-seven hunters bagged thirty-two moose and three deer. There were individual comments such as..... used for transportation only.....necessary for transporting and dragging your kill..... just took it along for taking out moose if successful.....appreciate the privilege of hunting with power toboggan.....good to reach hunting area only.....no opportunity to see moose.....not much help on hunt, more of a help to the moose.....had lots of fun.....machine broke down.....seems to scare moose.....

The Department recognizes that the snowmobile is a legitimate form of transportation and that its use is enabling anglers and hunters to disperse themselves to harvest crops of fish and game in formerly inaccessible areas. The extensive and unrestricted use of snowmobiles in Ontario will no doubt be allowed as long as outdoor enthusiasts "play the game", and use the machines as a benefit rather than a detriment to society.



THE SHEBANDOWAN LAKES

by C.E. Monk
Fisheries Management Officer, Port Arthur Forest District

July 14, 1870 was hot. Colonel Wolseley was tired. He planted a boot on the sandy beach of *McNeill's Bay and declared: "We'll camp here!" With the arrival of the historic Red River Expedition, the current of events had begun to flow. Access had been achieved. Shebandowan on that day, however, was still primeval bush. "The north shore," wrote Captain G.L. Huyshe, "has been repeatedly swept by fires at various intervals for many years past; and the blackened and branchless trunks of trees left standing here and there, sometimes in great numbers, present a strange, weird appearance, like ghostly witnesses of a bygone vegetation. On the south shore, the woods have been little injured by fire, but their growth is small, bespeaking a poverty of soil..."

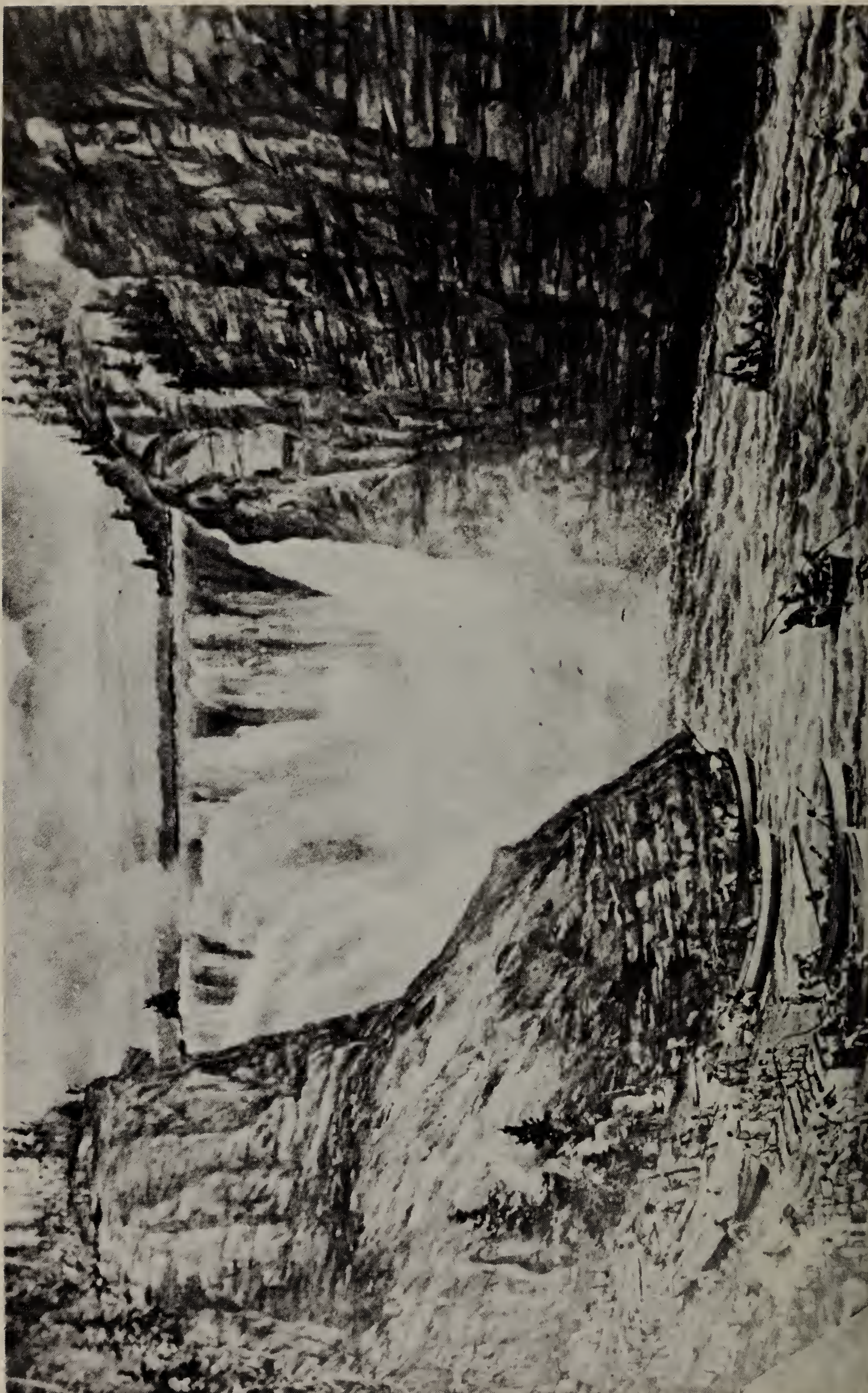
It is possible that some of Wolseley's soldiers feasted on the fish from Shebandowan in 1870. At that time, lake trout, pike and whitefish were important species in the lake. It is a safe bet too, that an ugly parasite, *Triaenophorus crassus*, plagued the whitefish.

A railroad was the next, and more permanent, access to Shebandowan Lake. Construction of the Ontario and Rainy River Railway (now the Canadian National) between the Lakehead and Winnipeg was completed in the fall of 1901. It skirted Shebandowan Lake some fifty miles west of the twin cities. Next year the trains began to roll, carrying grain to the elevators at Port Arthur and settlers to the fertile prairies. But nobody wanted "blackened and branchless trees" or "poverty soil". Shebandowan remained primeval bush.

About the first ripple to suggest a change in the current occurred in 1925. That year, according to local residents, the Kaministiquia Power Company blasted the narrows between Upper and Middle Shebandowan Lakes to speed the flow of water. Dams on the Kashabowie River and at the outlet of Lower Shebandowan were in operation to harness the power of this watershed.

The Thirties brought more changes. Those who could afford it took the train from the Lakehead to Shebandowan Station. To escape the scream of the sawmills and the dust of the elevators, they went fishing. A few lingered to build a cottage. Soon, a tiny settlement

"Lt. Colonel McNeill V.C., military secretary to the Governor-General, had been for some time at the lake and had pitched his camp on the shores of a pretty little bay with a charming sandy beach, which had been named after him, 'McNeill's Bay'".....from "The Red River Expedition" by Captain G.L. Huyshe on Pages 60 and 97. McNeill's Bay no longer appears on today's modern maps. It is, according to Huyshe's map, the first bay of the lake directly north from the outlet of Shebandowan Lake.



Red River Expedition, under Lord Wolseley, portaging around Kakabeka Falls in 1870.

sprang up between the railroad and the lake---and McNeill's Bay lost its identity.

Then in 1935, for reasons which may remain forever unknown, smallmouth bass were released into the lake. This was only a trickle, but by 1943 bass had spilled into all parts of the lake and were contributing generously to the angler's creel. More anglers visited the lake; more cottages were built. The waves of change continued to roll in, each one cresting a little further back on the beach.

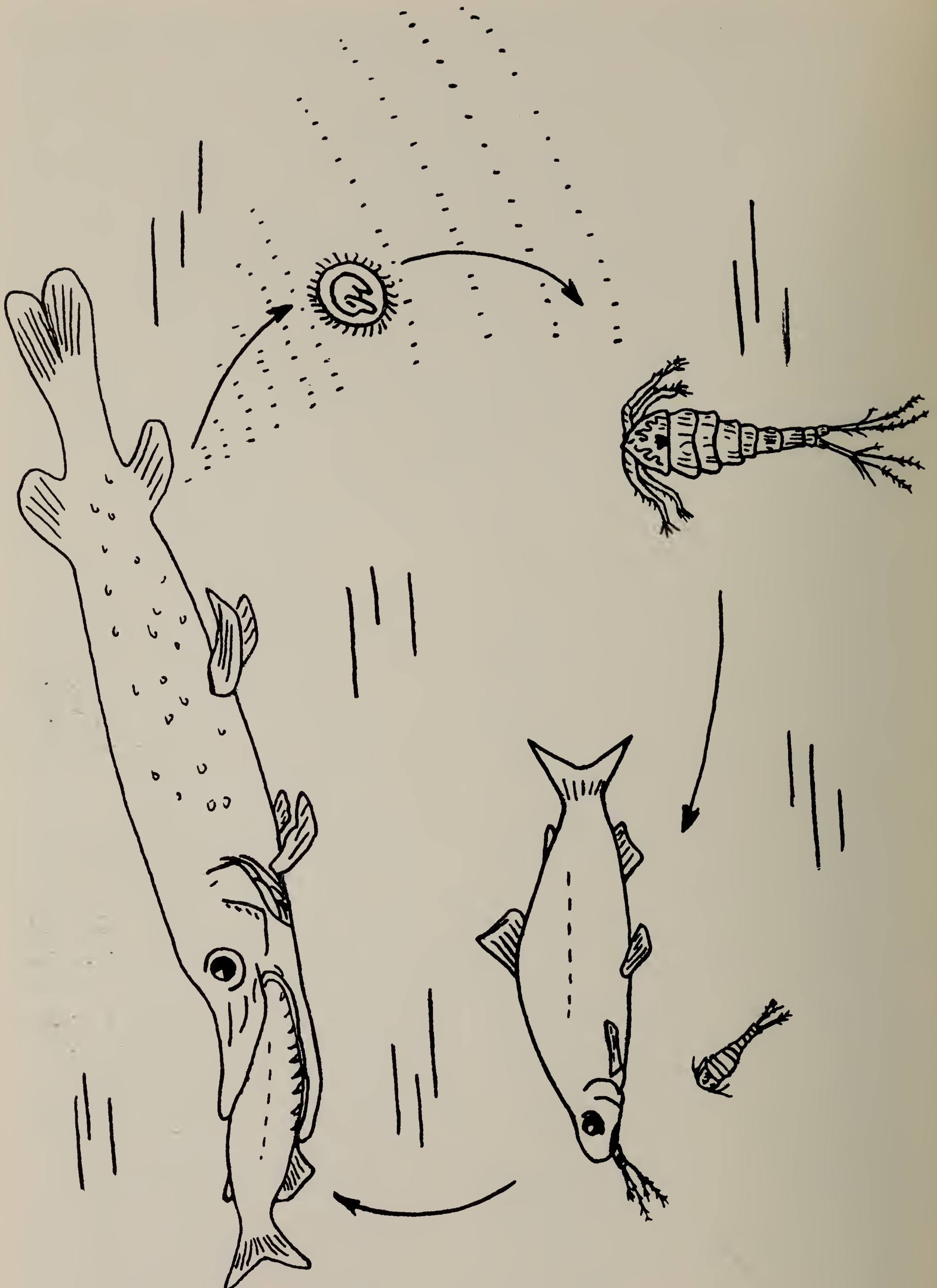
In 1945, three quarters of a million walleye fry were introduced into Shebandowan Lake. Accounts differ, however, as to the first walleye introduction. Scales from a Shebandowan walleye, examined by District Biologist G.C. Armstrong in 1951, indicated that it was nine years old---or spawned in 1942. It is generally agreed, though, that no walleye were actually angled until the late forties. A lake survey completed in September, 1949, caused Mr. Armstrong to chronicle the following candid remarks: "Walleye and bass on increase in recent years, probably at the expense of lake trout and pike."

By the late Forties, the shape of things to come was slowly coalescing. In the anglers creel, walleye and bass were replacing the lake trout and pike; on the lake, great swarms of power boats were displacing the canoe; and around Shebandowan two hundred cottages had already supplanted the tepee. The theme had been stocking; between 1945 and 1955, one million walleye and several thousand lake trout had been poured into the lake. Then, in 1949, an inverted concern for the whitefish expressed itself.

"Survey the lake!" wrote the cottagers, now organized into the Shebandowan Camper's Association, "....to determine if the abundant whitefish population was limiting the production of the lake trout." Surveys, conducted by Mr. Armstrong in 1949 and 1951, found a large, parisitized whitefish population living in the Shebandowan Lakes. The average whitefish weighed 2.7 pounds, and, commented Armstrong, "....the overall infestation rate runs at 1.34 cysts per pound of whitefish .... it is quite possible that the quality of the commercial species will improve with time. The fish populations in Shebandowan Lake are apparently undergoing a change in distribution and abundance; lake trout and pike are reported to be fewer in number. Therefore, it would seem that the natural changes of the environment may alter the present populations sufficiently to reduce the rate of infestation and, possibly, eliminate this primary obstacle to a commercial fishery." No one could have predicted the future whitefish status in Shebandowan Lake more accurately.

The commercial fishery began in 1955. On July 11, 1955, almost eighty-five years to the day since Wolseley first set foot on the shores of McNeill's Bay, the new district biologist, R.A. Ryder, wrote to Department headquarters, "After giving this request careful consideration, it was decided that such an operation would be beneficial to the sport fishery in the lake. Enclosed please find application for two hoop nets in Shebandowan Lake. We would greatly appreciate rapid processing of the licence, so Mr. Anderson can order his nets in time to fish this fall."

With the issuance of that licence, the tide of fortune began to ebb for *triaenophorus*. It had been a thorn in the whitefish's side for years---it was



Life history of Triaenophorus crassus: *Pike to water flea to whitefish to pike.*

time that thorn was pulled out.

Perhaps, it would be wise at this time to review the parasite's life history. *Triaenophorus crassus* has evolved until today it threads its life cycle from pike to copepod to coregonid fishes.

In late April or early May, an infected pike seeks a grassy shallows to spawn. Side by side, the eggs of the pike and the tapeworm tumble into the water--the tiny embryos unaware that when they meet again one will be in the intestines of the other. Shortly after reaching the water, the tapeworm egg hatches into a *coracidium.* It is covered with fine cilia (hairlike structures) and swims about freely for two days. Further growth is impossible unless it is swallowed within two days by a copepod, *Cyclops bicuspidatus.* Inside this 'water flea', the young parasite sheds cilia, bores through the stomach into the body cavity, and becomes a *procercoid* larva.

Here again, the cycle is in danger of being broken. The infested copepod must be eaten by either a herring or whitefish within two weeks. If this happens, the larva, liberated by the fish's digestive juices, penetrates the stomach wall and encysts in the flesh of the back of its host. Within the cyst, the larva, now a *pleroceroid,* is surrounded by a yellowish white substance consisting of broken down tissue of the host, and waste material from the worm. The life cycle is completed when the whitefish or herring is eaten by a pike and the larva develops into the adult tapeworm in the pike's intestines.

But within only two years, the first weak link in the parasites' chain appeared. "In 1957", explained Mr. Anderson, "only fifty percent were rejected for export---and they were a better size too--I got the odd jumbo!" (a jumbo whitefish weighs four pounds or more). Whitefish exported from Canada are required to pass an inspection by federal fisheries officers which includes the level of parasitic infestation.

The Shebandowan whitefish fishery continued to improve. By 1961, the flaw in the *triaenophorus*' chain was becoming a full fledged fracture. "Five years ago," remarked Mr. James Cullen, Federal Fishery Officer, "I first noticed the die-offs." In the flesh of the whitefish, the *plerocercoid larva* (the yellowish cyst) lives for about four years. To develop further into the adult tapeworm, the infected whitefish must be eaten by a pike. If this does not happen, the larva dies. According to the late Doctor Richard B. Miller, who did extensive studies of *triaenophorus* in western Canada," ...they (the completed cysts) become smaller and harder and may persist eventually as small, calcareous, yellow nodules." The cysts were dying within the whitefish in Shebandowan Lake---but more important, explained Mr. Cullen, "No new cysts were appearing."

The end came quickly. In 1964, more than eighteen tons of whitefish were harvested from Shebandowan Lake. Periodic inspections of these fish showed only two live cysts. A year later, more than twelve tons were taken---one live cyst was found.

Today, in a sense, the Shebandowan whitefish are like patient sheep, waiting to be fleeced. Mr. John Anderson of Shebandowan holds what is called "a fall management licence" to fish them. It permits gill-net fishing from October 15th until freeze-up. Mesh size of the gill-nets is usually 5½ inches, extension measure. The license calls for

Whitefish . . . . . a problem in 1949 . . . . .

the taking of whitefish and coarse fish only. The whitefish, according to Mr. Anderson, average in weight between five and six pounds. In the fall of 1965, a fifteen-pounder was taken.

The entire crop is exported to the United States where it commands an average price in excess of forty cents per pound, F.O.B. Shebandowan. For export purposes, Shebandowan Lake is now rated "Class A". Equally important, this fishery operates not only with the encouragement of the Department but also with the support of the cottagers.

To claim that any one event caused *triaenophorus'* demise in Shebandowan might be unwise. Possibly, the formula for the equation is a result of a number of things. The decline in the number

A commercial success in 1964.

of *plerocercoid larvae* is most significant. Within the required four-year period, the whitefish were obviously not being eaten by the pike: either the whitefish were becoming too large as pike food or the pike were too few to be an effective host. Perhaps, both theories are correct. During the lake surveys of 1964 and 1965, 59 pike and 53 whitefish were sampled; the pike averaged 2.3 pounds in weight and the whitefish averaged 4.1 pounds, or nearly twice as much.

We have already discussed the many changes in and around Shebandowan Lake, any number of which could have tipped the scales against the pike. But, aside from this, there is the physical character of the lake, itself, which almost precludes any sizeable pike community. Shebandowan Lake has a water surface of 22.8 square miles, a maximum depth of 124 feet, and an estimated mean depth of 25 feet. Its waters are relatively transparent (secchi disc reading; 142 feet) with a total dissolved solids rating of 66 p.p.m. and a pH of 7.0. Only about five per cent of the lake's 146 miles of shoreline provides suitable pike habitat.

In Shebandowan, the pike may always have been the weak link in the *triaenophorus*' chain. Certainly, since the Forties, the bass and perhaps the walleye have given them cause for concern. And the fishery, which released the whitefish to greater growth, merely provided the blacksmith's touch.

Today, tall pine and spruce have replaced the "blackened and branchless" trees of Wolseley's day along the north shore. The south shore, though, still "bespeaks a poverty of soil"--- but on a quiet day the throb of diamond drills can be heard; and the day when that shore will no longer bespeak poverty draws even nearer. Around Shebandowan, the cottages now number five hundred—while on the surface anglers, water skiers and boaters are uncountable. In the lake, walleye, bass and whitefish are the important species. To this far then, in less that a century, has Shebandowan's current flowed.

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MEDICINE FOR A MARSH

by J.F. Gardner
Biologist, Swastika Forest District
(Photos by the Author)

Have you ever heard of fertilizer for ducks? The application of chemical fertilizer has long been recognized as an effective means of increasing the productive capabilities of agricultural soils. But now, in an indirect manner, fertilizer may very well permit wildlife managers to boost duck production on marginal wetlands.

Experiments conducted in Michigan and Wisconsin, as well as on many of the large federal waterfowl refuges along the east coast of the United States, have shown that ammonium nitrate, a common chemical fertilizer, when soaked in fuel oil, is efficient in creating potholes and ditches in marshes choked with dense growths of aquatic vegetation.

Preliminary investigation of the Ghost River marsh, draining into Lake Abitibi, indicated the need to bring open water and nesting cover into closer proximity. Conventional methods of potholing and ditching, such as the use of heavy equipment and ditching powder, have been used for some time, particularly in the United States, but since the Ghost River marsh can be reached only by water, the use of draglines and bulldozers would have been impractical. This prompted us to set up a program using the ammonium nitrate-fuel oil mixture (commonly known as AN/FO) to blow a series of potholes on the south marsh of the Ghost River, an area of 413 acres.

A large proportion of this marsh had become choked with a matted growth of cattail and sedge; plant succession was taking its toll. Sedges were beginning to creep in behind the cattail mat paralleling the main river course through the marsh. Here, it was felt, we could accomplish two objectives: to restore a degree of open water interspersion with nesting and brood cover, and to test the efficiency of the mixture under most adverse conditions.

Because of its popularity as a blasting agent in mining and construction, it is now possible to purchase this material pre-mixed. Fifty-pound bags were obtained from a local dealer at $3.00 each. A ton of the material for the Ghost River program was moved by boat, five miles downstream from Highway #101 East to the edge of the south marsh. A large sedge and cattail area near the east shore of the marsh, where open water was virtually absent and the terrain was quite firm, was selected as the work area. Walking across the quaking expanse of semi-floating cattail mat to the site with a 50-pound load, while attempting to maintain equilibrium, could best be termed hazardous.

Although it is possible to prepare charges of any size by hand, it was

Walking across the quaking expanse of semi-floating cattail mat was "hazardous".

decided that the pre-mixed form would be most suitable at this location because of the difficult conditions which would be encountered, working on semi-floating cattail bog. As a guide line, we followed the methods used previously in Michigan and Wisconsin, but added a few wrinkles of our own.

Since the bog was extremely wet and water was being forced up ankle-deep by the weight of a man's body, electric ignition was used in preference to prima-cord fuse. This reduced the danger of "dead" charges as well as being cheaper and more safe. Care had to be taken to prevent puncturing the heavy polyethylene bags as the mixture is rendered insensitive upon contact with water. Fourteen of the twenty potholes were blown in a cattail-sedge area where the soil was mainly organic peat.

To begin with, two sticks of dynamite were capped, gently pushed about 18" under the ground surface, connected in circuit and detonated with a six volt battery. This minor operation facilitated the "mucking out" of the holes into which the charges were subsequently placed by cutting and loosening the dense mats of semi-decayed plant materials.

The "shot holes" were deepened to approximately three feet wherever the digging allowed. At this point, two sticks of dynamite were capped, tied together and taped to the outside of a 50-pound plastic bag of AN/FO, thus

Two sticks of dynamite were capped and taped to a 50-pound plastic bag of AN/FO.

preventing water penetration by eliminating the necessity of opening the bag. Two such charges were placed twelve feet apart, pushed down flat in the bottom of the shot holes, and connected in circuit with the leads of the blasting caps and the two ends of a double lead wire. As much stemming material as possible had to be rolled into the holes in order to weight the charges and keep them from rolling to the surface. This was most important since adequate stemming increases the force of the blast. After a quick safety check, all hands scrambled for the protective cover of some well-limbed trees approximately five hundred feet away.

Visions of possible difficulties danced across the mind as the lead wires were connected to the six-volt battery. One could only imagine the consternation of the Lands & Forests towerman on neighbouring Ghost Mountain as his mid-morning watch was suddenly shattered by an ear-splitting crash. In disbelief, he saw a few hundred square feet of his once quiet marsh propelled skyward in a 400-foot black, mushrooming cloud of debris. The blast formed a crater approximately 35 feet by 25 feet and six feet deep. In such marshy ground, the hole was soon filled with water. Clods of material torn from the soil by the blast formed a ring around the pothole. This rim varied from 10 inches to two feet in height and from two to four feet in width.

Once vegetation becomes establish-

"Propelled skyward in a 400-foot black, mushrooming cloud of debris".

ed along this rim, it provides readily available escape cover for a waterfowl brood using the pond.

The longevity of potholes, constructed in muck or peat soils such as these, is reduced due to the large amounts of organic matter which will settle out. However, since surface area rather than depth of open water is of major consequence to waterfowl, these ponds provide suitable habitat for several years at least. Drastic water level fluctuation greatly decreases waterfowl nesting success. On the Ghost River marsh, the water level in the ponds should be more stable because of their isolation from the main river course.

Of the 14 holes blasted in the sedge-cattail area, only one was not successful because the blast failed to cut the dense, matted root systems of nearby shrub growth.

It was later discovered that, although increased numbers of charges do enlarge the pond surface somewhat, ideal results were obtained using two 50-pound charges set 12 feet apart.

In one instance, three holes were blown where a layer of frost had persisted about eighteen inches below the surface. The lifting power of the charges was increased and considerably more material was removed by the blast. In another section of the marsh composed entirely of a cattail mat, from two to three feet thick with an underlay of clay, good results were obtained by setting three, 50-pound charges in a

The blast left a crater approximately 35' x 25', six feet deep.

Ghost River Marsh with new potholes for ducks.

twelve-foot triangle. The cattail mat was effectively split and rolled back, forming a 38-foot triangle, five feet in depth.

The degree of acceptance of the potholes by resident waterfowl remains to be determined, but the efficiency of AN/FO as a blasting agent has been established in this test under conditions which were far from ideal. It would appear that this material may be used not only in the improvement of dense cattail marshes, but also in reclaiming small woodland potholes filled in by advanced plant succession.

The principal advantage of this material is its low cost as compared with ditching powder. The twenty potholes created during this work cost an average of $7.26 for materials, a figure which would have been at least tripled had ditching powder been used.

In the future, the use of this common fertilizer may indeed be prescribed as "medicine for a marsh".

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OPERATION MUSKY

by M.J. Semotok and L. Penney
Sioux Lookout Forest District

For the greatest thrill of my life!...... penned the jubilant angler as he sealed an envelope containing one hundred dollars destined for his guide.

Sounds like a wild promotion scheme--well it's not. It is one of a number of stories that have appeared as far afield as KTBC-TV, Austin, Texas, and the outdoors column of the Kansas City Reporter. Why all the fuss?----The mighty musky!

The pikes have always been fishes of legend throughout northern Europe and northeastern North America. The maskinonge reaches the largest weight of any of the pikes, and is the glamour fish of them all. When the wary adult fish are caught on heavy trolling or bait casting equipment, they are tough and stubborn fighters, and once within the boat the battle to subdue them is only half completed.

The maskinonge has a wide but irregular distribution in Ontario. Of the numerous accessible lakes near Sioux Lookout, only six were known to contain musky and these have been subjected to concentrated angling pressure. Three small lakes to the southwest of the town were the most popular "fishin' holes" during the early 1930's, and protectionists in the area requested their closure to fishing "lest the species be eliminated". By the mid-Forties, this view had gained popular support.

The bid for closure was accepted for two reasons. Firstly, the musky taken in these lakes were usually below the legal size limit, and discard mortalities were high. Secondly, it was thought that these waters would serve as natural rearing ponds, and that surplus fish would emigrate to connecting lakes. In 1946, the lakes were closed to angling by an Order-in-Council.

In 1957, a tagging program was initiated to determine the effectiveness of the sanctuary. Over two hundred musky were tagged and returned to these waters, but after five years none of these tagged fish had been detected in adjacent waters. This shed doubts on the intended role of these waters as "natural feeders". Also, an analysis of scale samples revealed a reduced growth rate likely due to overcrowding and to an insufficient supply of forage fish.

Thought was then given to an alternative means of extending the range of this highly prized game fish. If this could be accomplished, it was envisioned that the musky could become an even greater attraction and a key advertisement for the local tourist industry.

Between 1963 and 1966, an active transplant program was begun, and techniques for the capture and movement of adult maskinonge in this area were developed.

Adults are captured in impounding gear at the beginning of their spawning run. The nets are lifted daily, and the fish are moved to shore in specially

Netted maskinonge for transplant program: a boon to anglers at Sioux Lookout.

designed tanks (18"x22"x51"). At shore, the fish are examined, tagged, and placed within a nylon retainer net which is staked out in the water. When a sufficient number of fish has been collected, they are removed from the retainer and placed in transport tanks. These tanks, measuring 18"x22"x51", are capable of holding from eighteen to twenty adult fish and seven cubic feet of water (about one pailful per fish). Fish survive well under these conditions for about twenty minutes, but if longer periods are involved, oxygenation of the water is required. With aeration, transport times can be extended to two and one-half hours. The fish are moved by truck or aircraft to the planting site where they are released into their new environment.

Through such efforts, populations of maskinonge are being established, and angling pressure is being distributed over a larger area. Considerable success has already been achieved. Over the past four years, close to one thousand adult muskinonge have been planted or introduced into thirteen new lakes. Subsequent natural reproduction has been confirmed at three of these sites.

During the netting operation in 1966, numerous musky, measuring as much as forty-two inches, were caught. This is well above the normal maximum size of fish encountered in these waters over past years. It would seem that the transplant programme has been successful not only in distributing musky to new waters but also in solving the slow growth problem of the overcrowded population in the sanctuary.

There is widespread enthusiasm and acceptance of this program amongst local anglers and camp operators.. Many an angler has dreamed of the mighty musky, with its secretive mannerisms and ferocious fighting ability. With an increasing distribution, there seems to be more and more hope that he may some day see his dreams realized.

THE LAKE TROUT OF BIG TROUT LAKE

by J.J. Armstrong
Biologist, Lindsay Forest District
(Photos by the Author)

Among the disciples of Isaac Walton, there is a particular breed of angler-- the lake trout fisherman; only the lake trout is worth his efforts. Just as the various specialists can be identified, so the lake trout fisherman, with his rod, large reel and metal line, can be recognized.

Because the lakes in populated areas have become subject to greater fishing pressures in recent years, some lake trout anglers have turned to new territories. Each year, more anglers fly into the northern wilderness. Increasing use of these remote resources makes it imperative that more facts about lake trout be learned so that the management of this select fishery can be based on sound biological information.

In 1962 and 1963, a study was undertaken at Big Trout Lake in the Patricia area of northern Ontario about 275 air miles north of Sioux Lookout. Aptly named, Big Trout Lake is 250 square miles in area; its clear water, deep and cold, is enclosed by rocky shores interspersed with beautiful sandy beaches. Here, to the occasional angler, the thought that someday this lake might be heavily fished seems unlikely. Nevertheless, it is apparent that short poles and large reels will become increasingly common on Big Trout Lake.

The lake trout still has many secrets. Because lake trout populations are seldom large, fisheries workers have difficulty in obtaining the data necessary for a clear understanding of its life history. The most important studies of this species usually have been conducted on larger waters, and these are relatively few.

The lake trout seeks out cool deep waters and thus remains unaffected by seasonal changes in water surface temperatures. As a result, it is a slow-growing fish, even in southern waters. However, after age determinations had been made on over 800 lake trout, it was found that the growth rate of trout in Big Trout Lake was approximately equal to the growth rate of lake trout in Lake Opeongo, far to the south, and in Great Slave Lake, far to the north. The lake trout of Lac La Ronge in Saskatchewan have been shown to exhibit a faster growth rate, as have the lake trout of Lake Superior and of Senaca Lake in New York State. The lake trout of Great Bear Lake in the Northwest Territories have shown the slowest growth of all the lake trout populations studied. (See Figure 1).

Usually, the growth rate in fishes is an indication of the productivity of the environment. As a general rule, lake trout in Big Trout Lake grow three inches per year between lengths of seven and 35 inches, 1.7 inches per year between 35 and 40 inches, and 1.1 inches for fish greater than 40 inches in length. The relationship of this rate of growth with productivity is consistent

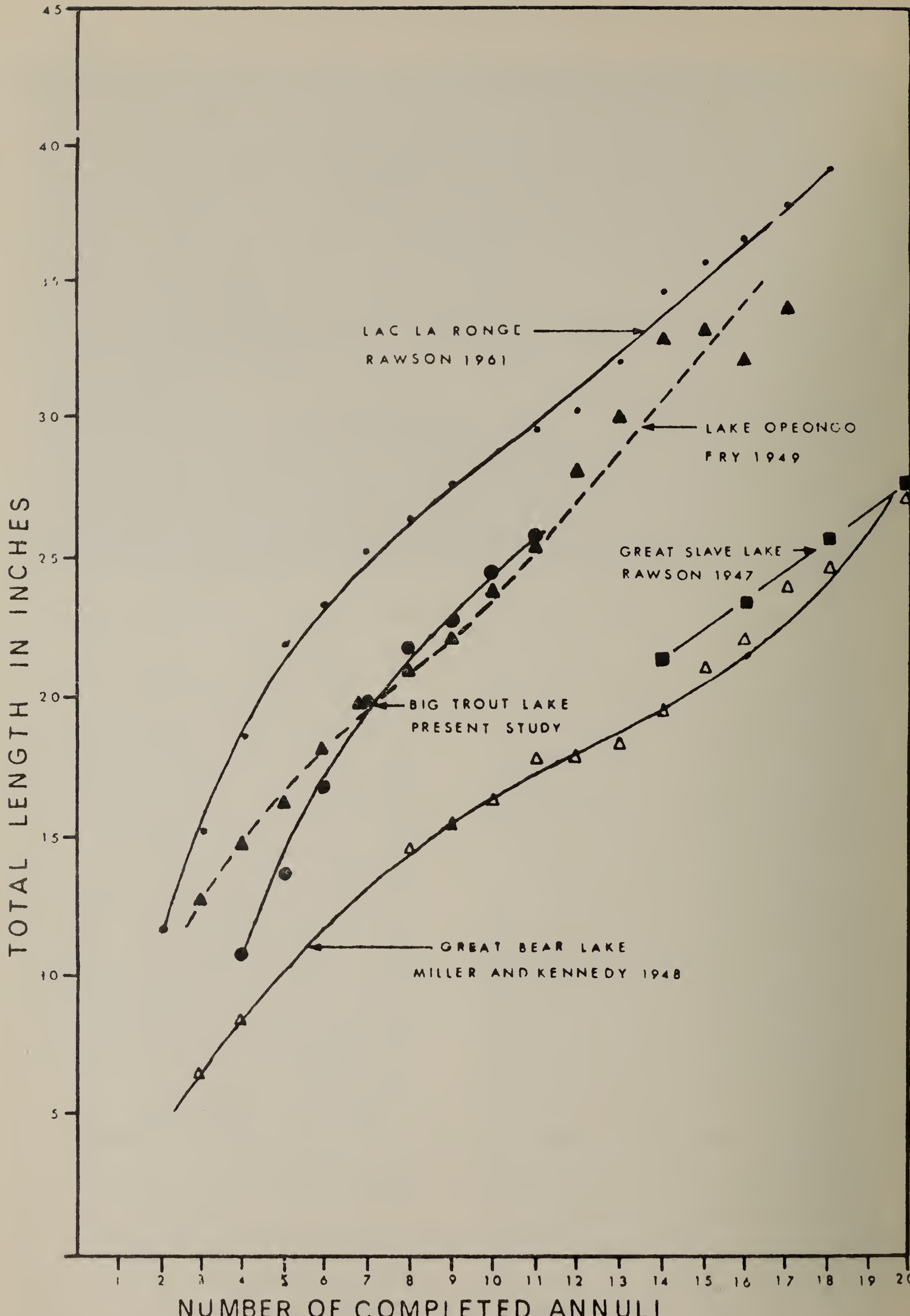

Fig. 1. *Graph showing the rate of growth of lake trout in Big Trout Lake and other waters.*

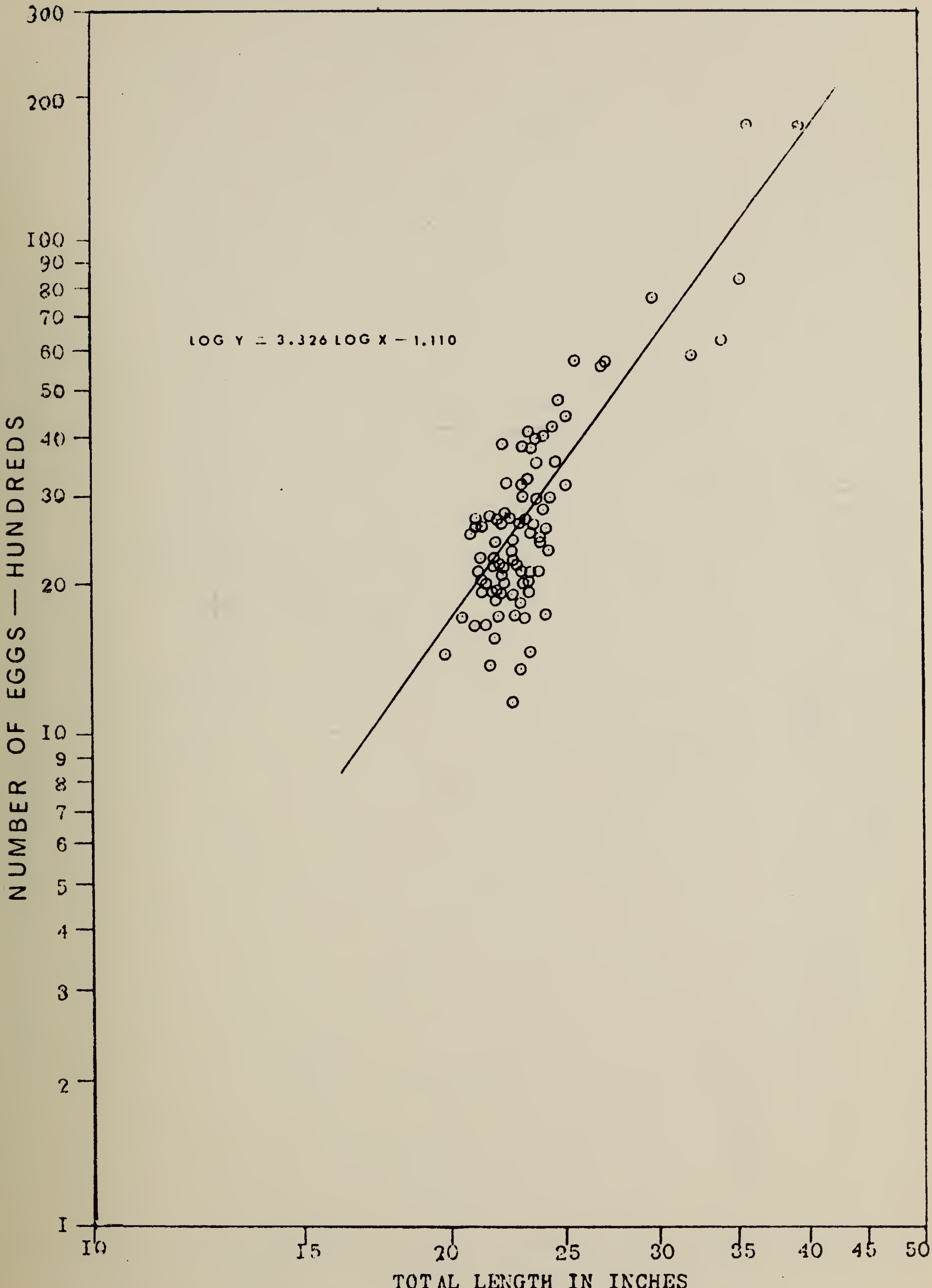

Fig. 2. Logarithmic graph showing relationship between length of lake trout and egg production.

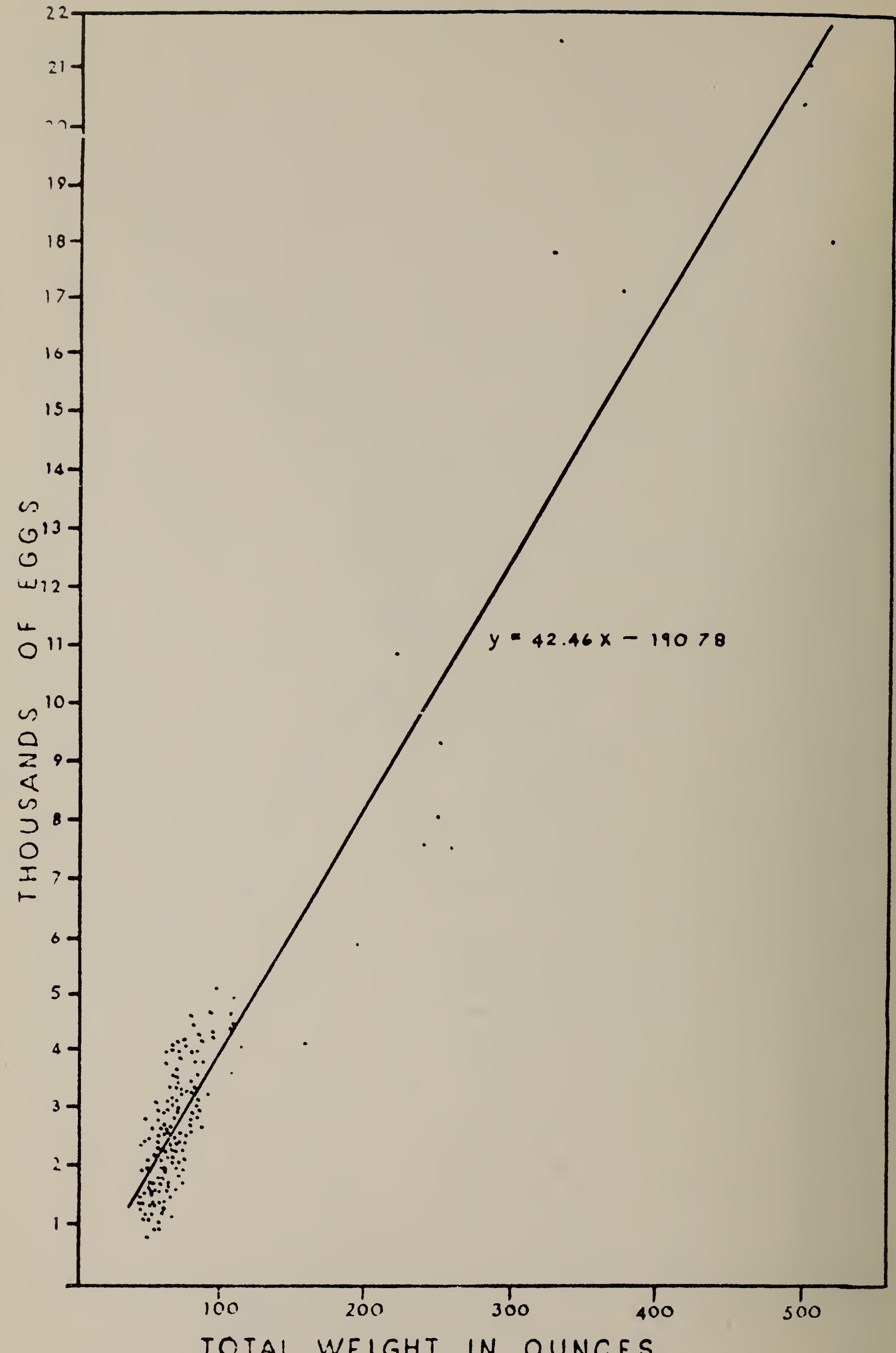

Fig. 3. Graph showing relationship between weight of lake trout and egg production.

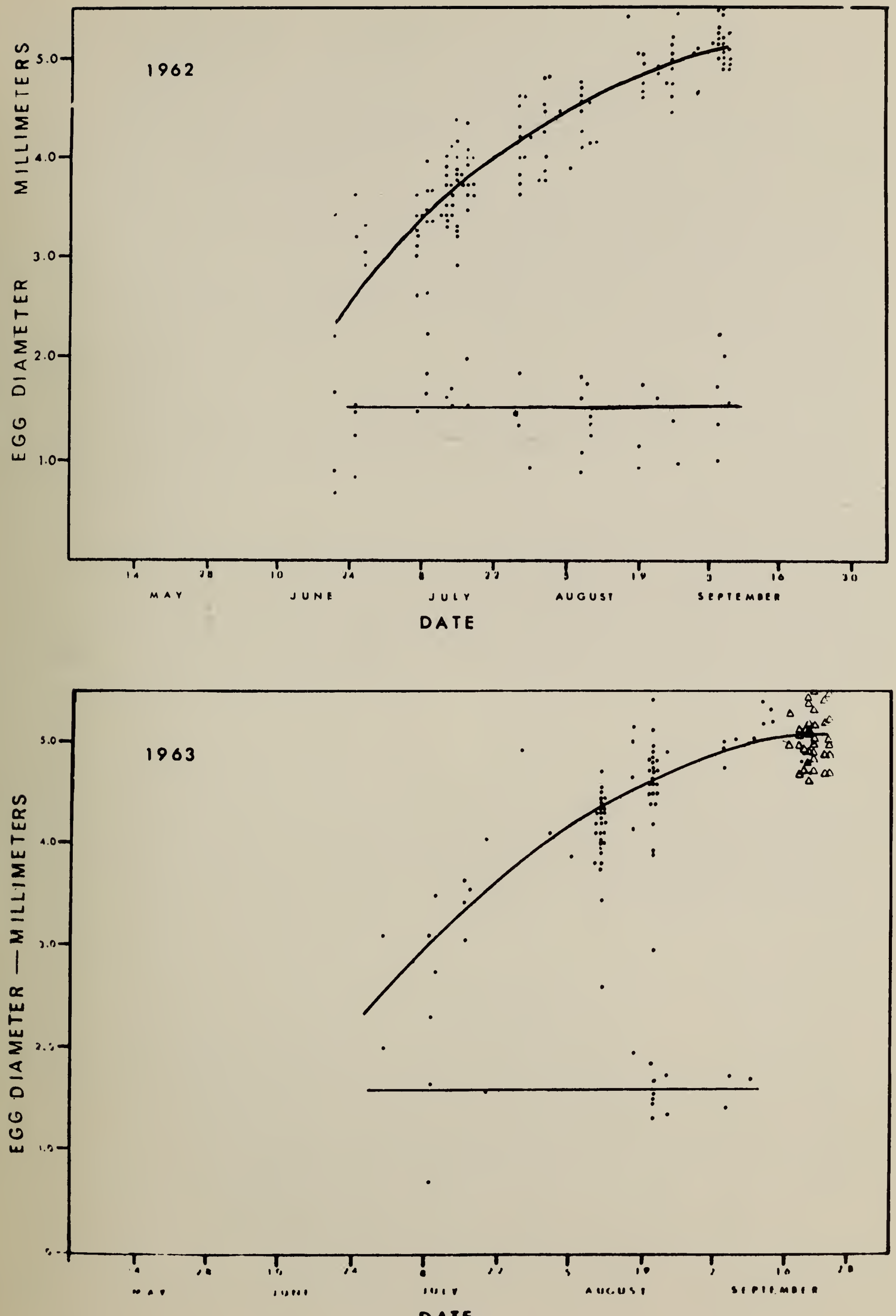

Fig. 4. Graph showing the size and growth of lake trout eggs during the period of development.

with the ratio found generally throughout the range of the lake trout.

It is interesting to note that a small proportion of the trout in this population grew faster than those described by the figures given above. Some fish were as much as 30 inches in length and over nine pounds in weight after only eight growing seasons. Generally, 20-inch trout average two pounds, seven ounces at seven years; 30-inch trout average nine pounds, two ounces at ten years; and 40-inch trout average 22 pounds, 13 ounces at 15 years of age.

The number of eggs produced by female trout over a wide range of lengths and weights are shown in Figures 2 and 3. In these figures, it will be noticed that, as a trout grows in size, it produces more eggs at a rate almost directly proportional to its increase in weight, or, to the third power of its length. The lake trout of Big Trout Lake produces 679 eggs per pound; this rate of production is comparable to that reported in similar studies elsewhere. For example, a 20-inch lake trout from Big Trout Lake produces approximately 1550 eggs, while a 30-inch trout produces 6,550. A 40-inch trout produces about 18,200 eggs at each spawning.

Measurements were made on the diameter of the eggs in ovaries examined during the period from mid-June to mid-September in each of the two years. These data, as shown in Figure 4, illustrate the growth in the size of the eggs during the period of development. The lower lines in the two graphs represent the size of the largest of the group of smaller eggs within an ovary. The upper lines represent the growth of the eggs that will mature and be spawned in that year. The eggs, stripped from female fish during the spawning season, range in size from 4.5 to 5.5 millimetres, as depicted by the triangles in the graph for 1963.

Results from previous investigations on Big Trout Lake gave rise to the suspicion that not all of the mature trout spawn annually. In other areas, where this phenomenum was reported, the size of the larger eggs in the ovary during the summer (preceding the spawning period) was approximately half the size of normally maturing eggs. Obviously, if alternate-year spawning occurred in Big Trout Lake, it would be reasonable to suspect that this phenomenum would be indicated by the presence of intermediate-sized eggs in the ovaries of the trout during the summer. Very few such intermediate-sized eggs were found.

The results from this study are of twofold value; they provide new and important data on the fecundity of lake trout; and they provide basic information on the reproduction potential of the species in Big Trout Lake for use in the management of this important resource.

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Lake trout from Big Trout Lake; the smallest is 21 inches in length.

Loading the trap net prior to tagging operation.